Magnetic Device Design and Evaluation Capabilities at JPL, R. KATTI, G. PATTERSON, K. HEIM, U. LIENEWEG, and B. BLAES, JPL. --- Capabilities for designing and evaluating magnetic devices and thin films will be described. Magnetic devices, including magnetic and hybrid data storage and memory devices, are currently being designed and characterized at JPL. Design tools include magnetic field computation, semiconductor device, and two-dimensional and three-dimensional magnetic and micromagnetic numerical simulations. Micromagnetic simulations using the Landau-Lifschitz-Gilbert equation are performed on workstations and supercomputers to compute local time-evo]ving magnetization dynamics of magnetic domains, domain walls, and domain wall structure. Evaluation systems include sequenced electro-magneto-optic observation systems which use the Faraday and Kerr effects and image processing to study local magnetization dynamics and statics in continuous or sampling modes with 10 ns temporal resolution and 100 nm displacement sensitivity. Magnetoresistance, magnetotransport, and fabrication characteristics can also be characterized. Other available facilities include SEM, TEM, AFM, and XRD. Magnetic materials with perpendicular and in-plane anisotropy are being investigated for use in magnetic data storage and memory devices. Recent accomplishments in the above areas include the design and evaluation of 1310th-lim memory test structures in epitaxial garnet films, hybrid magnetic-CMOS test memory cells, and metallic giant magneto] esistance (GMR) films.

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